

**SRI VENKATESWARA UNIVERSITY - TIRUPATI**

**MINOR**

SUBJECT: BIOTECHNOLOGY

W.E.F. AY 2023-2024

SEMESTER – II

**COURSE 1: ANALYTICAL TOOLS & TECHNIQUES**

Theory

Credits:3

3hrs/week

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**I. Learning outcomes:**

Students after successful completion of the course will be able to

1. Impart knowledge about the microscopy techniques.
2. Educate the student to characterize the separated biomolecules by spectroscopic techniques.
3. Gain knowledge on principles and applications of Chromatography and Centrifugation
4. Learn basic principles and types of electrophoresis
5. To familiarize with the concepts and the techniques of Radioactivity

**II. Syllabus**

**UNIT -1: Microscopy**

Structure of Light Microscope, working principle and applications of light, phase-contrast, fluorescent and electron Microscopy (SEM and TEM). Comparison between optical and electron microscope, limitations of electron microscopy.

**UNIT-2: Spectroscopy**

Beer-Lambert law, light absorption and transmission. Extinction coefficient, instrumentation and application of photoelectric colorimeter, and UV-visible spectrophotometer. Basic principles of atomic absorption and NMR spectroscopy.

**UNIT -3:Chromatography and Centrifugation**

Principles and applications of thin layer, gel-filtration, ion-exchange and affinity chromatography. Concept of HPLC. Basic principles of sedimentation and types of centrifugations. Concept and applications of preparative and analytical centrifugation.

**UNIT- 4:Electrophoresis**

Basic principles and types of electrophoresis, factors affecting electrophoretic migration. PAGE (Native, SDS-PAGE). Agarose gel electrophoresis. Introduction to 2D & Isoelectric Focusing.

## **UNIT – 5: Tracer techniques**

Stable and radioactive isotopes. Detection and measurement of radioactivity. Applications of radioisotopes in medicine and biological sciences. Autoradiography. Blotting techniques.

## SEMESTER II

### COURSE 1: ANALYTICAL TOOLS & TECHNIQUES

Practical

Credits:1

2hrs/week

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#### III. Skill outcomes:

The student will be able to learn the

1. technique of using microscope
2. technique of estimation of nucleic acids
3. technique of separation of pigments and amino acids
4. technique of separation of proteins and nucleic acids using electrophoresis
5. technique of separation of sample components using centrifuge

#### IV. Practical syllabus:

1. Observation of permanent slides under microscope
2. Quantitative estimation of nucleic acids
3. Separation of sample using paper chromatography
4. Separation of nucleic acids by using agarose gel electrophoresis
5. Separation of sample components using centrifuge

#### V. References:

1. Practical Biochemistry -Principles and Techniques by Keith Wilson and John Walker
2. Biophysical Chemistry - Principles and Techniques by Upadhyay and Upadhyay

## MODEL QUESTION PAPER

**Max. Marks: 75**

**Time: 3 hrs**

### SECTION A

**(Total: 5X5=25 Marks)**

(Answer any five questions. Each answer carries 5 marks  
(At least 1 question should be given from each Unit))

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10	
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### SECTION B

**(Total: 5X10 = 50 Marks)**

(Answer any five questions. Each answer carries 10 marks  
(At least 1 question should be given from each Unit))

11	A	
.		or
	B	
12	A	
.		or
	B	
13	A	
.		or
	B	
14	A	
.		or
	B	
15	A	
.		or
	B	